

Towards a scientific force: Some insights and a manifesto

V. RULL

Institut Botànic de Barcelona (IBB-CSIC-ICUB), pg. del Migdia, s/n, ES-08038 Barcelona, Spain

E-mail: vrull@ibb.csic.es

Just a glance at *Bad ideas? An arresting history of our inventions* (Winston, 2010) is enough to realize the overwhelming influence of scientific research on society through history. Almost everything we see, use and need in our quotidian life is a product or a by-product of scientific research not to mention the advances in medicine and technology, without which our everyday life would be very drastically different. Science also provides the more reliable scenarios for the future of the biosphere, and the better-informed strategies for nature conservation, in the face of the predicted future global changes. In addition, spectacular advances in the comprehension of the Universe and its essential matter-energy constituents, as well as in the unravelling of the more intimate nature of Life, among others, are also worth mentioning.

In spite of this, science and scientists have comparatively low societal valuation and decision power, and we spend most of our lives asking for fair salaries and research funding, as if we were asking for charity (Parker, 2002). Moreover, the budget dedicated to scientific research is among the first to be reduced under a crisis, as it occurs for example today, even in the more rich economies. In addition, science has neither voice nor vote in public affairs and in the planning of the future of the planet, and their warning claims often receive the same consideration that those from purely activist organizations. The more influential position achieved by science, as an institution, is that of an advisory body at the

service of the dominant political-economic system, which filters the knowledge provided and decides which aspects to take and which ones to bypass in order to secure its continuity. For example, the Intergovernmental Panel on Climatic Change (IPCC), the leading international body for the assessment of climate change, is not independent at all, as their members are designated by the governments of the countries belonging to the United Nations (UN). In spite of the Nobel Peace Prize obtained in 2007 (curiously, a non-scientific prize), the IPCC is no more than a consultant organization without any executive or decision power.

Science is too important and its achievements too decisive for humanity to be relegated to a merely advisory activity for transitory political and economic forces to take major decisions about the present and the future of the world (Jacobs, 2012). Science should attain a higher societal status to secure decision power and to lead decisions in which scientific knowledge provides fundamental criteria. Therefore, the role of science and their practitioners in a globalized context like the present should be reconsidered. The challenge is twofold. Scientists should push for attaining such a status among leading forces, but at the same time, they should revise their own relationship with society. Both activities would act synergistically in a positive feedback, as more incidence of science on society will result in higher impact on political and economic forces, which in turn, will favor greater societal integration of science.

A challenging proposal

Several strategies have been proposed to increase the societal impact of science, from an active involvement in politics to a direct interaction with authorities and society (Curry, 2009; Johns, 2009; Orr, 2009). An example of the first option is the recent creation of a political party, the *Science Party*, in the UK, with the aim of ensuring that science, mathematics and engineering have sufficient funding, skills and political priority (<http://scienceparty.org.uk/>). The second option has manifested in several ways, as for example negotiation with political authorities and organization of popular activities to divulgate science. So far, political negotiation has been sterile, as demonstrated in the latest worldwide summit meetings (Rull, 2010, 2011). Direct communication of scientific researchers and society would be a very promising initiative, provided scientists are able of leaving their laboratories and begin to interact with society on a larger scale (Johns, 2009). All these and other similar options, as well as the potential methodologies to attain them, have been (and actually are) widely discussed but their success has been testimonial, so far. The proposal here is groundbreaking: to progress towards science as one more institutional force, with the same status and decision power that any other political or economic force or, in other words, a parallel independent force outside any temporarily dominant system. Obviously, such a proposition requires a more detailed explanation.

It should be admitted such the scenario is hard, perhaps impossible, to fit into the currently dominant system, based on economic growth, competition and rewarding. The main reasons are funding constraints and external incentives to researchers. First, it should not be forgotten that research funding is currently dependent on capitalist rules, which aim is to perpetuate the system. Therefore, any initiative trying to challenge this economic system would be ignored, at best, or actively combated if it is considered important enough to be subversive. On the other hand, the system has the appropriate mechanisms to maintain the researchers attached to it through rewards to individual success oriented to exalt their ego, such as political or academic influence, media exposure, prizes, and eventually fame and glory (though not in the same degree as, for example, sport or movie stars, whose activities produce a lot of money in the short term). Therefore,

this essay cannot be considered a call for immediate action but an exhortation to scientists to take the opportunity that could represent an eventual future shift in the global order.

It is well known that social, economic and political systems, no matter if local, regional or quasi-global, have been succeeded one after another through history. Therefore, it is expected that the currently dominant global capitalism will, someday, collapse and give way to a new system in a natural way (Speth, 2009). So far, it is not possible to predict the features of this eventual new order but, given the current technological developments in communication, it is likely that it may be of potentially global reach. In this endeavor, science should be ready to assume the corresponding responsibility, but this time as an active player participating in the social transformation and remaining as a leading and independent force once the new establishment is achieved.

Insights for a manifesto

Whatever the strategy, the venture of upgrading science to a leading and decisive worldwide status should be addressed globally, for which we need to identify and agree in the basic principles of science, and elaborate a set of minimum requirements that any scientist in the world interested in the initiative can adopt as the basis for action. Here, I offer some tips and clues, in the hope that this will promote discussion leading to this minimum agreement. I reproduce the words of Robert Winston (2010) in the introduction of his scientist's manifesto: "It may seem presumptuous, but it is offered as a starting point for a helpful change in thinking". A number of science manifestos and declarations have been already published, hence, the need for one more should be justified, and their eventual differences explained.

The official declarations of UNESCO and the European Union explicitly express in their respective manifestos the need for scientific knowledge as a vehicle for progress, development and sustainability (UNESCO, 2000; EU, 2009). Therefore, for them, scientific research is implicitly understood as a means to promote and maintain the current political and economic status quo, thus depriving scientific independence. This support is explicitly stated in the latest European Commission's agenda for scientific research, the 7th Framework Pro-

gramme (FP7), which considers that “Knowledge lies at the heart of the European Union’s Lisbon Strategy to become the most dynamic competitive knowledge-based economy in the world” (http://cordis.europa.eu/fp7/understand_en.html). In other words, knowledge is considered as a fundamental basis for economic competition, which is to say economic growth. Other manifestos are actually action plans to improve national or regional science systems or to contribute to the development via scientific research (Watson *et al.*, 2008; Urama *et al.*, 2010). Manifestos dealing with intellectual property and free software have also proliferated in the last years, most of them only accessible by Internet (e.g. <http://freedomofscience.org/>). There are also manifestos presenting science as a political alternative, as for example the one of the already mentioned UK *Science Party*. The Winston’s (2010) manifesto is more general but it prioritizes the social responsibility of scientists and implicitly assumes that negotiation among scientists and the dominant forces is a solution. The *Manchester Manifesto*, of the Institute for Science, Ethics and Innovation, of the University of Manchester (<http://www.isei.manchester.ac.uk/TheManchesterManifesto.pdf>) also makes emphasis on the intellectual property issue, although it also offers interesting general tips on science itself. The recent *Geek Manifesto* (Henderson, 2012) also shows the paramount importance of science in all the aspects of the quotidian life and advocates for a new movement to upgrade science and scientific outcomes. However, this movement does not contemplate a change in socio-political order, as it proposes that science should be used “to create life-enhancing technologies and to drive economic growth” (Henderson, 2012).

Within the framework of this essay, the scientific proclamation needed should have four main basic foundations: (1) It should be independent, that is, free from any non-scientific influence (external forces); (2) it should be timeless, independent from any transient historical circumstance; (3) it should be universal, that is, acceptable by any scientist of the planet, independently of their particular condition; and (4) it should consider science as one more force, with the same status and decision power that any other political or economic power. The last point is especially important and should be briefly explained to avoid misunderstandings. The idea behind this point is neither that of science as one

more ideological, political or economic tendency into play nor an obscure pseudo-religious or secondary movement, but of a parallel independent force outside the temporarily dominant system. Indeed, any activity of the eventual scientific power must be absolutely transparent and open to public scrutiny.

The tips offered at following contain some ideas from other existing manifestos already mentioned, but they are largely the result of an attempt to distillate the main concepts without any external constraint. In some of these points, as in some of the basic foundations mentioned above, the influence of the famous “Mertonian norms” or CUDOS (communalism, universalism, disinterestedness and organized skepticism), as well as other considerations from the extensive work of Robert K. Merton (1973) and his critics (e.g. Stehr, 1978) on the subject, is also patent. As stated above, the following thoughts are offered as a matter of discussion to achieve a scientific code as simple as possible, in order to maximize its generality and, hence, its acceptance.

The manifesto

- (1) Science is the intellectual act by which humans generate and organize knowledge *per se*. Knowledge generation makes sense by itself, and does not need a justification or an external context for its development.
- (2) Science is a natural outcome of the functioning of human mind and, as such, a genuine human attribute and an unavoidable necessity. Rather than merely the consequence of human curiosity, as is often considered, science is a manifestation of the inevitable human need and passion for knowledge.
- (3) Science is based on observation and experimentation, hence, the raw input is exclusively factual. The ultimate aim of science is to understand the world, from the more intimate nature of matter to the origin and evolution of Life and the Universe, and to predict its potential future evolution.
- (4) Science is not an ideological, philosophical, social, political, economic, moral or religious movement, sect, system or tendency (the external forces), and must remain independent from any of

them. Any attempt to transform science into one more of these external forces is incompatible with the principle of independence.

(5) Any dispute between science and any religion or other faith-based systems is non-sense and sterile by definition, as they try to explain the world using incompatible axioms and knowledge methods, and have contrasting ultimate objectives. As human beings, scientists may have or have not religious beliefs; however, these beliefs should not interfere in the job as science practitioners.

(6) Scientific knowledge has profound impact on humanity and, therefore, involves a great deal of societal responsibility. Rather than being merely an advisory entity, science should participate in human decisions with the same status and executive power than political, economic and other forces, especially when global topics are discussed.

(7) Science should not be competitive (in the capitalistic sense) or an instrument to attain personal or institutional success in the form of rewards (power, notoriety, popularity, money, prizes, etc.). As a fundamental human need, funding for science should proceed from society, via public investment, and should be administered by scientific organisms, without the influence of external forces.

(8) Science and scientists should be demystified. Scientists are neither geniuses, savants nor any other type of superior beings by definition, but professionals of science. Scientific performance should be part of quotidian life. Scientific advances should be part of the current cultural background of every citizen in the world and scientists should be directly and actively involved in achieving such goal.

(9) The results of scientific research should be transferred and explained to society in a clear and objective manner. Transfer should be preferably straightforward, without any intermediaries, which are usually poorly informed or submitted to external constraints or biases (e.g. mass media). The ultimate objective of popular science is not to downgrade scientific performance to make it understandable for any citizen in the world, but to increase the cultural level of all these citizens to allow them understanding science as is.

(10) Science provides the knowledge for biological, medical and technological discoveries and improvements, oriented to human health and wellbeing but these are not the only societal objectives of scientific research. Knowledge generation and appropriate transfer should also contribute to increase individual and collective freedom and free will. A society of formed and informed citizens is less prone to manipulation.

(11) The distinction between basic and applied science is unnecessary. Every result from scientific research is, sooner or later, applicable for the benefit of society. Those applications considered harmful for society derive from the influence of external forces and/or personal interests.

(12) Science should have one single universally accepted ethical code, a code that meets the conditions of universality and independence, without any political, cultural, religious or ideological bias.

Final words

A number of these points may be hard to assimilate within the current reality but, as stated above, they should be viewed as a basis for a societal transforming opportunity. Rather than wait for the new global order to come and then see how to fit in it, scientists should be influential in attaining a different world where science has the importance that it deserves. A potential drawback is that scientists are human beings and, as such, subjective and corruptible. This is not expected to change in the near future but it is hoped that natural selection will operate better in a context in which external influences and their corresponding unsafe incentives are out of the scientific play.

REFERENCES

- Curry, S. 2009. Widen the channels of communication with society. *Nature* 458: 702-703.
- EU (European Union) 2009. *Research for sustainability and the European Union: From wish to will. A manifesto*. Manifesto presented at the Conference "Sustainable Development: a Challenge for European Research" (Brussels, May 26-28 2009). Retrieved March 15, 2012, from http://ec.europa.eu/research/sd/conference/2009/pdf/scientific_committee_manifesto.pdf#view=fit&pagemode=none

- Henderson, M. 2012. *The geek manifesto: why science matters*. Bantam Press, London.
- Jacobs, H. 2012. Things we know we know. *E. M. B. O. Rep.* 13: 279.
- Johns, D. 2009. The international year of biodiversity – from talk to action. *Conservation Biol.* 24: 338-340.
- Merton, R. K. 1973. *The sociology of science: theoretical and empirical investigations*. University of Chicago Press, Chicago.
- Orr, D. 2009. Retrospect and prospect: the unbearable lightness of conservation. *Conservation Biol.* 23: 1349-1351.
- Parker, J. 2002. How much is a scientist worth? *E. M. B. O. Rep.* 3: 1012-1015.
- Rull, V. 2010. El mito del desarrollo sostenible. *Collect. Bot. (Barcelona)* 29: 103-109.
- Rull, V. 2011. Sustainability, capitalism and evolution. *E. M. B. O. Rep.* 12: 103-106.
- Speth, J. G. 2009. *The bridge at the edge of the world. Capitalism, the environment, and crossing from crisis to sustainability*. Yale University Press, New Haven.
- Stehr, N. 1978. The ethos of Science revisited: social and cognitive norms. *Sociol. Inq.* 48: 172-196.
- UNESCO (United Nations Educational, Scientific and Cultural Organization) 2000. *World Conference on Science. Science for the twenty-first century. A new commitment*. UNESCO, Paris.
- Urama, K. C., Ogbu, O., Bijker, W., Alfonsi, A., Gomes, N. & Ozor, N. 2010. *The African manifesto for science, technology and innovation*. African Technology Policy Studies Network, Nairobi.
- Watson, J., Boland, M., Burns, C. et al. 2008. *A science manifesto, or plan for the recovery of New Zealand science*. Royal Society of New Zealand, Wellington.
- Winston, R. 2010. *Bad ideas? An arresting history of our inventions*. Bantam Books, London.